Monitoring Study Group Meeting Minutes

September 24, 2008
CAL FIRE Mendocino Unit Headquarters—Howard Forest

The following people attended the MSG meeting: Shane Cunningham (CAL FIRE), Clay Brandow (CAL FIRE), Drew Coe (CVRWQCB), Dennis Hall (CAL FIRE), Dave Longstreth (CGS), Sean Gallagher (DFG), Matthew Buffleben (NCRWQCB), Ben Zabinsky (NCRWQCB), David Wright (Campbell Timberland Management), Stormer Feiler (NCRWQCB), Julie Bawcom (CGS), and Pete Cafferata (CAL FIRE). **[Action items are shown in bold print]**.

We began the meeting with general monitoring-related announcements:

- A video documenting the consequences of undersizing a culvert, with a dramatic culvert failure that occurred near Freeport, Maine, is available for viewing at: http://www.wmtw.com/video/17144859/index.html
- The 7th watercourse crossing workshop that CAL FIRE, DFG, CGS, and the RWQCBs presented was held in Felton on September 10th. In total, approximately 320 individuals were trained from November 2006 to September 2008, with roughly half agency personnel and half RPFs/landowners.
- The 11th annual Coho Confab will take place on September 26th-28th at Rock Creek Ranch on the South Fork of the Smith River. For more information, see: http://www.calsalmon.org/pdf/Cofab%20Poster_052908_proof4.pdf
- The Society of American Foresters (SAF) National Convention will be held in Reno, Nevada from November 5-9th. The session is titled "Forestry in a Climate of Change", with more information available at: http://www.safnet.org/
- The CLFA Fall Workshop on Wildlife Management will take place on October 24, 2008 in Redding; more information is available at: http://www.clfa.org/workshops.htm
- The American Geophysical Union Fall Meeting will be held in San Francisco from December 15-19th. Hydrology Sessions include: "Who Knows How the River Flows? Understanding Sediment Movement Through Fluvial Networks"; and "Strengths and Limitations of the Paired Watershed and Model Approaches to Detect Change in Hydrology and Water Quality Research." More information is available at: http://www.agu.org/
- Brief SEAT (State Emergency Assessment Team) reports were provided by three MSG participants that worked on post-fire assessments this summer. Dave Longstreth reported on his involvement with the Basin/Indians Fires SEAT in the Big Sur area, as well as his work on the Mendocino Complex fires; Drew Coe described his involvement with the Butte SEAT; and Clay Brandow summarized his work on the Telegraph Fire SEAT, located near Mariposa. In general, they found that identified values-at-risk for lives and property were consistent with those previously described in USFS or BLM BAER reports prepared for these fires, but that the federal BAER reports tended to focus primarily on public lands. They agreed that it would be more cost efficient to first send out small pre-evaluation teams to determine if full SEATs are needed (similar to what Mr. Longstreth and Mr. Feiler conducted for the Mendocino Complex). Dave Longstreth described some very high risk areas for lives and property that were identified for the Basins/Indians Fires area (this SEAT report is posted at: http://www.co.monterey.ca.us/PR_Attachments/20080917SEATREPORT.pdf).

Coastal Mendocino County Fish Monitoring Project/ Pudding Creek Project

Sean Gallagher, DFG, provided the MSG with a PowerPoint presentation titled "Regional Monitoring of Salmonid Abundance: A Pilot Study in Coastal California." David Wright, CTM, followed Sean's presentation with a PowerPoint showing specific fisheries data he has collected in the Pudding Creek watershed over the past three years. **Both Sean and David's PowerPoints are available on the MSG website at: http://www.fire.ca.gov/CDFBOFDB/board/msg_archives.asp.**

Sean began his presentation by stating that the regional monitoring pilot study was a 3 year cooperative project (2005/2006 through 2007/2008). Cooperators include DFG, CTM, NOAA Fisheries, Humboldt State University, Clemson University, and West, Inc. He described the two stage approach being used to estimate regional abundance of coho salmon and steelhead. The goal is to develop statistically valid data on adult ESU-level escapement for both species (i.e., data at a broad, regional level, not on an individual stream basis). To make these estimates, data were collected on five study streams in western Mendocino County: Pudding Creek, Hare Creek, Caspar Creek, Little River, and the South Fork Noyo River. A statistical approach known as "generalized random tessellation stratified (GRTS) sampling" was used to determine where to sample on these five streams. This method provided a random 10% grid sample that was distributed in space and spatially balanced, which allowed an estimate of population parameters to be made for the whole region.

Three life cycle monitoring streams were included as part of this project to calibrate fish monitoring parameters to the other streams in the regional study. These sites consisted of a floating broad resistance weir installed in lower Caspar Creek, the egg collection station on the South Fork Noyo River, and the fish ladder on Pudding Creek. Various approaches have been used to make fish population estimates in these watersheds. Mark and recapture of salmon carcasses was not found to correlate well with coho escapement on an annual basis. In contrast, live fish capture and recapture was found to provide reasonable estimates of coho escapement. Similarly, redd counts were found to provide a good index of escapement and can be transformed into fish numbers using spawner: redd ratios from life cycle station studies. Redds are much easier to count than live fish. An additional approach denoted as "area under the curve" or AUC documents fish residence time. This method requires knowledge regarding average observer efficiency, which is roughly twice as high for coho compared to steelhead. AUC worked reasonably well for most years with field data correlated to fish escapement, but field surveys were difficult to conduct.

Using population data collected at the five study streams, it was determined that the 10% GRTS sampling provided a good overall regional population estimate (i.e., 10% grid sampling was successful). Sean stated that sampling 8 reaches out of 76 provided the same estimate as would have been obtained by using all 76 reaches. Similarly, sampling at 10% provided the same estimate as sampling at 15%, 20%, 25%, 30%, and 35%, which has huge implications for reducing monitoring costs. The goal is to apply this sampling scheme to the entire North Coast area. Sean estimates that 43 reaches will be needed for the coho salmon ESU. Finally, Mr. Gallagher explained that while data from the past 8 years reveals that the number of coho salmon are declining, the trend was not found to be statistically significant.

David Wright followed Sean's presentation with considerable information on the Pudding Creek Project, which has been conducted from 2006-2008. As stated by Sean, Pudding Creek is one of the life cycle monitoring study locations used in the regional study. This watershed borders the north side of the city of Fort Bragg, providing easy access for field

work. The entire basin is located within 15 miles of the coast, so the climate of much of the watershed is moderated by the cool summer marine layer, keeping summer water temperatures relatively cool (generally MWATs range between 14-16^{o} C). Pudding Creek is a coho dominated stream network, which is unusual for this region. Mr Wright reported that coho comprise 90% of the spawning salmonid population, with steelhead constituting less than 10% of all migrating salmonids. Pudding Creek has many of the habitat attributes associated with good coho production, including a low channel gradient with significant pool formation, a lower reach that is marshy with backwater alcoves (more like coastal Oregon), relatively dense canopy cover, and good shelter conditions. Additionally, Pudding Creek has a dam with a fish ladder designed for fish counting located near the ocean. The dam was built in 1953 and provides researchers with the ability to count fish with a high degree of certainty, allowing fish numbers to be calibrated to redd survey information.

The main components of the Pudding Creek Project are: (1) adult coho and steelhead trapping (for mark-recapture estimates), (2) spawning surveys, (3) downstream migrant trapping to estimate smolt production, and (4) over-summer juvenile abundance surveys. David summarized what has been learned regarding life history timing for coho in this watershed. These fish generally enter the stream in November and December. They either spawn quickly or delay until March, depending on rainfall. Fry mainly emerge in April, with smaller numbers observed in March and May. Juveniles rear throughout the spring and summer, with most juvenile outmigration occurring between March and May. The pattern for steelhead is generally similar, with some exceptions. Migration into the estuary and spawning is spread out over time, with peak spawning occurring later in the season. Since steelhead may spend multiple years rearing in freshwater, there is always some component of the population present in the stream. Juvenile outmigrants are not counted at the Pudding Creek dam, but they are observed in the fish ladder as early as November.

Additional information was provided for specific life history aspects. Regarding run timing, coho generally move in large groups in the beginning of the season, usually dictated by flow, while steelhead spread their run out over the entire winter season. Mr. Wright stated that spawning locations seem to be dictated by flow conditions in Pudding Creek. When flows are larger, fish appear to spawn higher in the system. Relative abundance of the two species has been found to differ depending on age class. During downstream and upstream trapping, it is nearly the same at over 90% coho. However, the juvenile relative abundance from electrofish surveys indicates that steelhead comprise the majority of the summertime population. David stated that he believes this is due to the flexible life history of steelhead, where multiple age classes and resident trout reside in the stream. Coho growth during 2006 through 2007 was also described. From spring to spring, coho grew at a mean rate of 0.4 mm/wk, while from fall to spring they grew at about 0.7 mm/wk. From spring to fall, they recorded no growth or negative growth. This contradicts study results from the Pacific Northwest, which shows summer time growth. Mr. Wright explained that the lack of summer growth in coastal Mendocino County streams is likely due to extremely low summer stream discharges (concentrating fish in small pools where there is extreme competition for food). PIT tags are used to mark downstream fish, so each fish is uniquely identified and there is length-weight data on all recaptured fish. This data has shown that size class is not necessarily a good indicator of age, and that young-of-the-year (YOY) fish grow faster than year-old fish.

Coho over-winter survival for 2006-2007 was estimated at 18%, with confidence intervals ranging from 16-21%. Based on over-summer electrofish densities, it was estimated that approximately 42,600 coho were reared in Pudding Creek in 2007 ($\pm$ 15,750). Coho

escapement, or the number of spawners, has decreased in the last three years from approximately 700 fish to 200 fish. The number of outmigrants has decreased as well, from approximately 23,000 fish to 11,000 fish. Regarding ocean survival, when gauged either by the comparison of population estimates or by the PIT tag returns, the 2006-2008 cohort had very poor marine survival at less than 1 percent. A review of the literature generally shows a much higher return rate on the west coast (2.5-11%). Data from Mr. Sean Hayes, NOAA Fisheries, reveals a region-wide drastic decline in coho numbers this water year. The percent decline for the number of spawners found in water year 2006 to those found in 2008 generally ranged from approximately 30% to 100%.

The Pudding Creek Project conclusions for three years of study are: (1) the anadromous fish in Pudding Creek are primarily coho, (2) summer rearing appears to be a period of low growth, (3) first-year coho (instream) are often the same size as second-year coho, and (4) marine survival was unusually low during 2007-2008.

Hydrologic Impacts of Roads

Drew Coe, CVRWQCB, provided the MSG with a PowerPoint presentation titled "The Impact of Forest Roads on Hydrological Processes and Pathways: A Review of Published Literature." Mr. Coe stated that this talk was originally developed based on a literature review he wrote for the Committee for Cooperative Monitoring, Evaluation, and Research (CMER) in Washington. Drew's presentation was organized around three main questions: (1) What are the hydrological processes and pathways affected by roads?, (2) At what spatial and temporal scales are these processes affected?, and (3) What can be done to mitigate the hydrologic effects of roads? **Drew's PowerPoint is available on the MSG website at: http://www.fire.ca.gov/CDFBOFDB/board/msg_archives.asp.**

Hillslope runoff processes were explained as including Horton overland flow (HOF), groundwater, subsurface stormflow (SSF), and saturation overland flow/return flow. HOF is very uncommon in undisturbed forestlands but does occur on highly compacted areas, such as road surfaces. SSF occurs on steep slopes and is very common in northern California and the Pacific Northwest (PNW). Drew explained that highly compacted roads have little or no pore space, high bulk densities, and low saturated hydraulic conductivities (generally < 5.0 mm hr^{-1}). As a result, road surfaces typically generate HOF when rainfall intensities are greater than $1/5^{th}$ inch per hour. Logging roads can intercept shallow subsurface flow and rapidly route it to the stream network, potentially leading to increased peak flows in headwater basins. Road cut interception can be responsible for up to 95% of total road runoff in PNW watersheds. The velocity of intercepted water, which becomes overland flow, is 1 to 4 orders of magnitude greater than SSF, potentially decreasing the lag-to-peak and increasing the magnitude of peak flows. The magnitude of subsurface flow interception is dependent on site geology, depth to bedrock, and depth of the road cut (with shallow soils intercepting more water).

The combination of HOF, intercepted SSF, and potentially "pirated" water from low order drainages increases the likelihood of gully and landslide initiation along roads. Additionally, road segments can deliver excess runoff to the channel network at stream crossings. Drew has found that the percent of roads connected to the stream network is linearly related to mean annual precipitation (usually between ~20% and 50% of road segments are connected). Often only a relatively small percentage of road segments contribute to peakflow augmentation (related to hillslope position and topography of the impermeable layer). Roads dominated by HOF can increase peak runoff in low order (i.e., 1^{st} order) channels by 10%,

but roads dominated by intercepted SSF can increase it by 50% in snowmelt areas and up to 500% in rain-dominated areas.

At the small watershed scale, paired watershed studies (e.g., HJ Andrews, Caspar Creek) have not shown increases in mean annual peak flow due to roading (with the exception of when >12% of area is compacted with roads and skid trails). These types of studies, however, have been hampered by insufficient pre-treatment calibration data, lack of treatment replication, and poor experimental control (i.e., road building and timber harvesting have often occurred simultaneously or in quick succession). Modeling studies have shown that increases in peak flows due to roads were approximately equal to the effects from timber harvesting (canopy removal) in a watershed in western Washington. The effect of both activities declined as the flow recurrence interval increased. Additionally, modeling studies suggest that roads can decrease baseflow during the summer months. Much uncertainly still exists, however, regarding the hydrologic effects of roads at the watershed scale. If there are impacts from road building on peak flows, these effects will be more pronounced and easier to detect in smaller basins.

The primary implication for management is that more road runoff equals more road surface erosion, increasing the likelihood of gullying or mass wasting below road drainage structure outlets. The main mitigations to use to reduce sediment delivery to stream channels include: (1) avoiding excess stream crossings, (2) draining roads frequently, (3) minimizing direct connectivity to the channel network, and (4) minimizing cutslope/flowpath interaction.

Brief MSG Monitoring and Tracking (M+T) Submmittee Update

The MSG M+T Subcommittee has not had conference calls in June, July and August due to fire assignment absences. Numerous questionnaires for gathering information on monitoring projects from all entities in the state have been submitted to the subcommittee. Drew Coe, CVRWQCB, stated that he is finishing a spreadsheet summarizing the basic monitoring questionnaire data. **He stated that he expects to have his spreadsheet summary available by late October, when he will distribute it the M+T Subcommittee.**

MSG Interagency Mitigation Monitoring Program (IMMP) Subcommittee Update

Pete Cafferata reported that a draft version of the IMMP Subcommittee pilot project final report has been completed and is posted on the Monitoring Study Group website at: http://www.fire.ca.gov/CDFBOFDB/PDFS/Draft_IMMP_Pilot_FinalRpt_071008.pdf. **The final version of the report will be presented to the Board of Forestry and Fire Protection at their October meeting in Sacramento.** In order to inform the MSG of the IMMP Subcommittee's findings, as well as to prepare for that presentation, Pete Cafferata, Shane Cunningham and Dave Longstreth provided the group with a PowerPoint presentation on the final report.

In brief, the IMMP pilot project was developed by the MSG IMMP Subcommittee composed of 20 individuals from the resource agencies, timber industry, and the public. Subcommittee meetings have been held since the spring of 2005. A primary objective of the IMMP is to provide a forum that allows interagency team members to cooperate and promote information sharing. The main goals of the IMMP pilot project were to: (1) to develop and test methodologies for collecting monitoring data primarily on high risk watercourse crossing sites and make needed refinements prior to implementing a full scale program, and (2) more broadly, to develop a process to reach agreement with an interagency team that can be

applied to other forestry-related topics. The pilot focused on watercourse crossings and road segments that drain to crossings, since past monitoring work has shown that these are particularly high risk sites for sediment delivery to stream channels. The pilot project work was conducted by two IMMP teams, with one team working in the Coast Range and headquartered in Santa Rosa, and the other working in the interior portion of the state and headquartered in Redding. The IMMP pilot project teams were composed of one representative from each of the following state agencies: CAL FIRE, DFG, CGS, and the RWQCBs. The team approach was used to provide a balance of interests for all the Review Team agencies and greater public confidence in the monitoring results.

Several field protocols were evaluated on 54 non-randomly selected watercourse crossings selected from 22 plans on non-federal timberlands in California in 2006 and 2007, including a portion of the BMP Monitoring Protocol developed by the U.S. Forest Service for 12 northeastern states. Field work emphasized performance-based effectiveness evaluations after at least one wintering period for practices applied at or near watercourse crossing sites that were thought to pose a high risk to water quality. Due the several changes to the field protocols during the pilot, only general findings are presented in the final report rather than specific data results.

The pilot project's findings include: (1) a protocol for evaluating practice effectiveness at and near watercourse crossings in California was successfully developed; (2) while tedious to use, the protocol forced team members to be objective and reach consensus; (3) the pilot project was an effective team building exercise—demonstrating that the Review Team agencies can work together cooperatively and achieve consensus; (4) virtually all crossings and/or road approaches to crossings deliver some sediment (i.e., "trace" amounts) to watercourses, even when the rules and additional THP measures are properly applied; (5) improper installation and/or maintenance of crossings and drainage structures near crossings, and improper crossing removal, are major causes of sediment movement and deposition; (6) road approaches near crossings produce a high percentage of sediment transport/deposition problems; (7) photographic logs are extremely valuable in documenting effectiveness of practices; (8) the pilot project was a beneficial training exercise that developed skills necessary for evaluating watercourse crossing and road approach performance; (9) the IMMP approach for problem solving should be continued, but not be limited to watercourse crossings; and (10) better practice implementation can be achieved with improved LTO training, and more active and post-active multi-agency inspections.

The primary recommendation from the pilot program focuses on using the newly developed watercourse crossing protocol as a multi-agency training tool to help field personnel recognize critical situations during field inspections. The IMMP Subcommittee recommends that the protocol be used as a mandatory Review Team training tool, where agency staff are rotated into regional teams on a regular basis to prevent staff "burn-out." Quality assurance/quality control (QA/QC) oversight teams will be needed to verify data accuracy and consistent application of the protocol.

Brief update on the FORPRIEM Monitoring Program

Clay Brandow, CAL FIRE, briefly reported that FORPRIEM (Forest Practice Rules Implementation and Effectiveness Monitoring) training sessions have been completed for all of CAL FIRE's field units except for San Mateo-Santa Cruz. To date, Clay has received monitoring forms from 16 THPs. Additionally, CAL FIRE watershed staff are currently testing

a beta version of the FORPRIEM database, along with associated database queries and database reports.

Brief BOF Technical Advisory Committee (TAC) Update

Pete Cafferata provided a rapid PowerPoint updating the MSG on progress made with the Board's Technical Advisory Committee (TAC). The TAC was formed in September 2006 to oversee a scientific literature review of studies pertinent to riparian buffers and functions. This was in response to the Board's ongoing review of the Threatened or Impaired Watersheds Rule Package and the need to make changes based on science-based input. Due to limited funding available to hire a contractor, the TAC formed five subcommittees to address key riparian functions (heat/microclimate, biotic/nutrients, wood, sediment, and water). Each subcommittee created background primers for their function, produced a list of newer papers for the contractor to review, and developed a set of key questions for the contractor to address. Key questions focused on how forest management activities in or near riparian zones affect production and delivery of the function (e.g., wood), how the findings of the reviewed papers affect buffer strip delineation, and determining if there are regional differences for the function under consideration.

The contract was put out to bid twice, with Sound Watershed Consulting (SWC) being awarding the contract in April 2008. Their main tasks were to review the literature for each riparian function, synthesis the literature, and present their findings to the Board. Mike Liquori is the Principal for SWC and the lead for the project. Assisting Mike are Dr. Lee Benda, Dr. Bob Coats, Dr. Doug Martin, and Dr. David Gantz. Final chapters for all the riparian function modules except the sediment riparian module are posted on the Sound Watershed Consulting webpage (see: http://www.soundwatershed.com/BOF.htm).

The schedule calls for SWC to have all remaining contract materials to Chris Zimny, CAL FIRE contract administrator, by September 30th. Mr. Liquori will present their final report to the Board during their October 8th meeting in Sacramento. Additionally, a Technical Expert Forum will occur on October 23rd in Sacramento (9:00 a.m. to 4:00 p.m.). During this session, there will be discussion by invited experts, TAC members, Board members, and the public on the SWC literature review findings. Experts expected to participate include: Dr. Lee Benda, Benda and Associates; Dr. Robert Beschta, Prof. Emeritus, Oregon State University; Dr. George Ice, NCASI; Dr. Tom Lisle, USFS-PSW, Arcata; Dr. Lee MacDonald, Prof., Colorado State University; Dr. Mary Ann Madej, USGS, Arcata; and Dr. Gordie Reeves, USFS-PNW, Corvallis.

Next MSG Meeting

No date was set for the next MSG meeting, but it is anticipated that it will be held in Redding in mid-November.